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Serious Drought Lingers

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Abstract
The drought of 2012 in the Midwest was a continuation of a weather anomaly that began in 2010. The historical indicator of El Nino and La Nina is the Southern Oscillation Index (SOI). The index is based on the 90-day standardized deviation of atmospheric pressure between Tahiti and Darwin, Australia. The standardized difference reached 0.8 on July 22, 2010, signifying the beginning of a La Nina event (Figure 1). By Oct. 23, 2010, the event was clearly the second strongest event in the 100+ years of record keeping. The young but potent La Nina resulted in an abrupt change in weather on a planetary basis that included record flooding in Montana, N.D. and adjacent Canada, and enormous amounts of water to drain into the Missouri river during 2011. The event ended a several year drought in the northwest United States and ended (with drought) a six year continuous string of above trend U.S. corn yields (figure 2).

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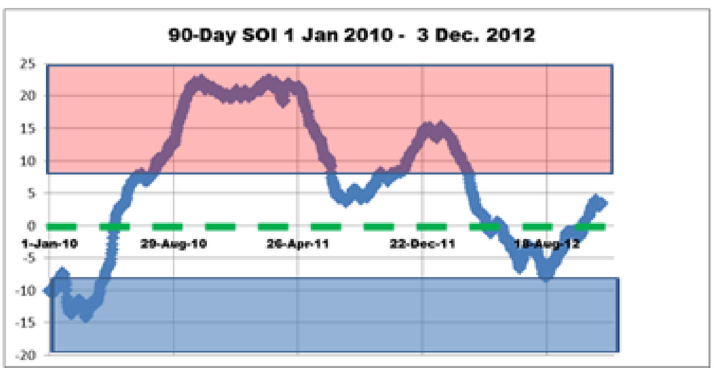

Figure1. The La Nina event that initiated July 22, 2010, reached peak strength on Oct. 23, 2010, second only to the mid-1950s event. The SOI reached El Nino threshold on Aug. 16, 2012, but did not establish. On Oct. 30, 2012, the SOI returned to the La Nina side of a neutral condition. Data from http://www.longpaddock.qld.gov.au/.

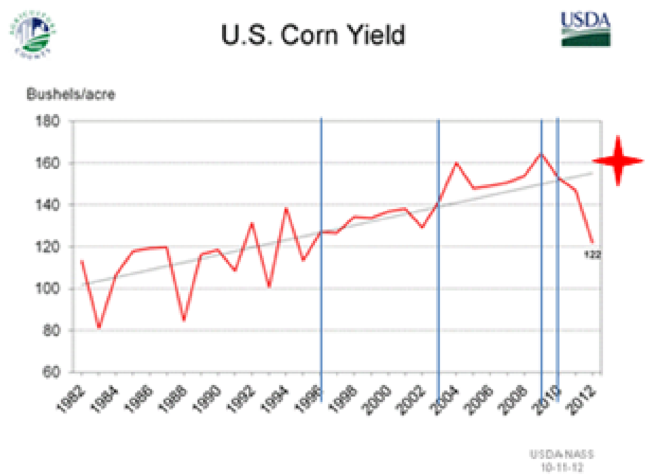

Figure 2. U.S. corn yield 1982-2012. The U.S. corn yield exceeded the trend for six consecutive years (2004-2009) and fell below trend in 2010. The "trend yield" for 2013 is near 160BPA (indicated by star). USDA graphic: NASS.USDA.gov

Drought in 2011 was much like the drought in the mid-1950s: developing in the south central United States with rain becoming scant in the Corn Belt after early July. Midwest crops depleted the subsoil moisture to the extent of rooting depth, and over winter precipitation did not bring full recharge to western Corn Belt soils. Rooting conditions in 2012 were near ideal and observed corn and soybean roots to depths greater than 8 feet were reported in numerous locations. Deep rooting provided sufficient water to enable a greater than anticipated crop yield in numerous Corn Belt locations, but resulted in about 8 feet of moisture depleted soil and a resultant requirement of 16+ inches of moisture needed to replenish subsoil moisture. It is not likely that subsoil moisture will be fully replenished by the beginning of the 2013 planting season.

Moisture deficit in the subsoil increases the risk of crop yields being below trend and prevents the recovery of river, pond and well water to normal levels.

Measurements of soil moisture are made at 1-foot intervals to 5 feet at several locations. Figure 3 is a map of the "normal April 15" soil moisture. Observations of the moisture at selected locations were made in the fall of 2011 and 2012. The fall observations are useful in that November water is retained throughout the winter and is indicative (to the extent they are short of normal) of the moisture deficit yet to be corrected.

Historically, severely deficit precipitation years of the magnitude of 2012 do not recover to normal annual precipitation in a single year (Figure 3). Accordingly, an additional year of significant moisture stress is considered to be not unlikely and a fourth consecutive year of below trend U.S. corn yield a distinct possibility. The probabilities will become more definitive in the early weeks of 2013 as the likely phase of the El Nino/La Nina for the growing season becomes manifest.

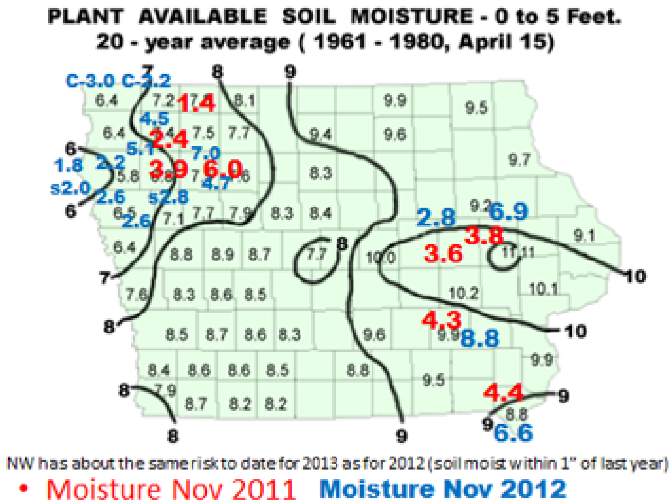

Figure 3. Normal subsoil moisture as of April 15 during the period 1961-1980. Soil moisture capacity is between 10 and 11 inches for the top 5 feet of soil for moist agricultural soils of Iowa. November moisture in 2012 exceeded observations for November 2011 in southeast Iowa and will likely result in normal values when augmented by spring rain. In northwest Iowa, the November 2012 observations were less than 2011 in locations sampled.

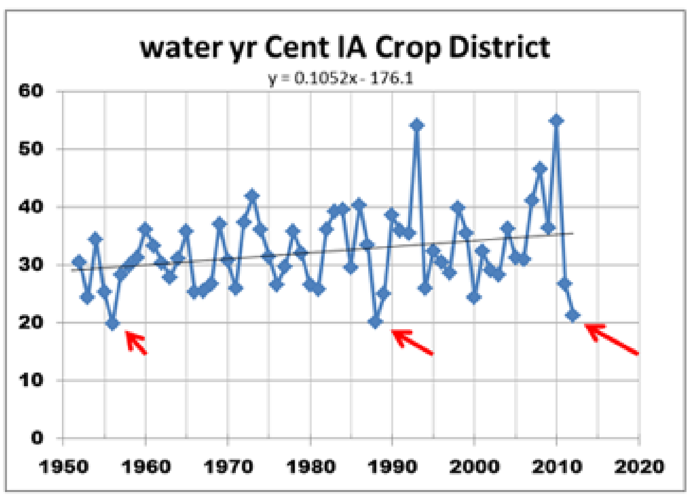

Figure 4. Precipitation received in central Iowa during the water year (Oct. 1 through Sep. 30). The three historically driest years since 1950 are 1956, 1988 and 2012. In both cases, the subsequent year also received below normal precipitation and experienced below trend yields in Iowa.

Elwynn Taylor is an extension climatologist and professor of agronomy. He can be reached at (515) 294-9985 or 3-mail setaylor@iastate.edu. Observations of subsoil moisture were provided by Joel DeJong, Paul Kassel, Jim Fawcett and Greg Brenneman, extension agricultural specialists.

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